Elasticity Analysis Using NYPSC Staff Approach

Standard economic theory can be used to determine whether—given the growth of intermodal platforms and competition—absent regulation, Verizon would likely be able to control telecommunications prices in the areas that it provides service. In competitive markets, if a firm implements a significant price increase—an increase above the competitive level—then customers will seek out alternatives and the price increase will result in lower revenues and be unprofitable. Not all customers have to be able to switch to alternative suppliers in order to make the price increase unprofitable; all that is required is that there be enough customers switching suppliers to cancel out the revenue increase from the customers that stay.

We can apply standard economic theory and information on the extent of intermodal competition in Virginia—information that is readily available—in order to analyze what the likely impact would be if Verizon increased its prices significantly. The information needed in order to perform this analysis consists of:

- The percentage of Verizon customers that have adequate choice in telecommunications suppliers ("competitive customers") and the percentage of customers that do have a smaller degree of choice in telecommunications suppliers;

- the (firm-specific) own-price elasticity of demand for a bundle of telecommunications services for those customers classified as competitive and those customers classified as less competitive;

- the initial price for a bundle of telecommunications services; and

- the proposed hypothetical percentage increase in the price of the service.

Based upon this information, we can determine whether a hypothetical price increase on the part of Verizon would result in revenue gains or losses, thus providing us information on whether Verizon has the ability to control prices in the areas it provides services. This analysis can be done at the state-level as well as at the MSA level. The analysis at the state level is similar to an analysis performed by the Staff of the New York Public Service Commission in a recent proceeding in that state regarding reclassifying residential services.[1]

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[1] See Case 05-C-0616, "Telecommunications in New York: Competition and Consumer Protection," A White Paper Prepared by the State of New York Department of Public Service Staff (September 21, 2005), Appendix E ("*Staff White Paper*"); and Case 05-C-0616, "Statement of Policy on Further Steps Toward Competition in the Intermodal Telecommunications Market and Order Allowing Rate Filings" (issued and effective April 11, 2006) ("*Competition III Order*").

A. Determination of "competitive" customers

For purposes of this analysis a Verizon competitive customer is located in an area that is served by at least two intermodal platforms. Customers who are not in areas that are served by at least two intermodal platforms are classified as "less competitive" customers, even though in reality even they have competitive options.[2]

For each wire center, I determine whether customers—business and residential customers separately—can select from zero, one or two intermodal platforms. If a wire center is being served by at least two intermodal platforms, then all Verizon business and residential customers in that wire center are classified as competitive customers. If, on the other hand, a wire center is being served by fewer than two intermodal platforms, than all the Verizon business and residential customers in that wire center are not classified as competitive customers. This information—*i.e.*, the proportion of competitive and less-competitive customers—is used in the revenue calculations described below.

1. Broadband platform

For broadband availability, I examined whether businesses (households) are in areas where: (1) cable broadband is available, (2) fixed-wireless broadband is deployed, and (3) DSL/FiOS is deployed and available. Warren Cable Factbook identified areas in which cable companies offered cable modem services. For fixed-wireless broadband I obtained data from publicly-available coverage maps of firms that offer the service. For DSL/FiOS I obtained data from Verizon. These sources provided maps showing where these broadband platforms are available in Virginia. These areas were then combined with business locations from Dunn & Bradstreet and household locations from the Census Bureau.

Thus, for each wire center, the data show the number and proportion of business and residential locations in areas in which customers have access to cable modem, broadband wireless or DSL/FiOS service. If two thirds of business (residential) customers in the wire center had access to any of these platforms then I concluded that broadband service was available to businesses (residences) throughout the wire center.[3] If a wire center met that criterion then all Verizon business (residential) customers were classified as having access to a broadband platform. A separate determination was made for business and residence customers.

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[2] While I classify these customers as "less-competitive" for purposes of this analysis, generally these customers have access to at least one intermodal platform or access to the traditional wireline platform offered by CLECs. Thus, some of these customers are likely to switch suppliers in the face of a significant price increase by Verizon.

[3] Two-thirds is the percentage that the NYPSC Staff used in its analysis for residential customers. Specifically, Staff concluded that a broadband option was available "if two thirds or more of the population-weighted zip codes in a wire center contained either cable or DSL broadband options." See *Staff White Paper* Appendix E.

2. Wireless platform

For wireless availability, I combined data on areas served by each wireless carrier (from their websites) with Dunn & Bradstreet data on business locations and Census Bureau data on household locations. I assumed that business (residential) customers in the wire center had a wireless competitive platform available if two or more unaffiliated wireless carriers served business (residential) customers in the wire center.[4] If a wire center met that criterion then all Verizon business (residential) customers were classified as having access to a platform.

3. Competitive indicators

I classified wire centers as having zero, one or two intermodal platforms available to business (residential) customers in addition to wireline alternatives. Table B1 below summarizes my analysis at the state and the MSA-level. Across Virginia, approximately 99% (91%) of Verizon business (residential) lines are located in wire centers in which (i) two or more wireless carriers provide service and, (ii) at least 2/3 of households are served by broadband providers. Less than 9 percent of residential lines and less than 1 percent of business lines are in wire centers in which only on of the two platform criteria are met, and only 0.2% (0.0%) of residential (business) lines are in wire centers in which neither of the two criteria are met.. These lines, however, still have access to competitive suppliers in the form of the traditional wireline CLECs; and at least some of them have access to one or more intermodal platforms—although they don't meet the specific thresholds.

At the MSA level, the data in the table demonstrate that the statewide results apply generally to these smaller geographic areas. With respect to business and residential services, almost every MSA has at least approximately 90 percent of lines in areas served by at least two intermodal platforms. (Only residential services in Charlottesville and Lynchburg have lower percentages of lines at 61 percent and 77 percent, respectively.) Even in the more rural non-MSA areas, the majority of business and residential lines are served by at least two intermodal competitors.

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[4] This criterion was used by the NYPSC Staff in its analysis for residential customers, see *Staff White Paper*, Appendix E.

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Table B.1. Extent of Intermodal Competition in Virginia, Statewide by Region

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B.   Illustration of lack of market power as a result of intermodal options

Standard economic theory, combined with data on the proportion of "competitive" and "less-competitive" customers can be used to predict the impact on revenue from a hypothetical price increase on the part of any supplier, in this case Verizon. I assume that Verizon faces the firm-level demand elasticity in wire centers corresponding to competitive customers and the market-level demand elasticity in wire centers corresponding to less-competitive customers.[5] For lines that have two or more platforms (competitive customers) I use the firm-level demand and assume a price elasticity of -1.5 while for lines that have less than two competitive platforms (less-competitive customers) I use the market-level demand and assume a price elasticity of -.50.[6] I then calculate revenue impacts corresponding to a five percent price increase using the proportion of less-competitive and competitive customers calculated above.[7] For sensitivity, I also calculate revenue impacts corresponding to a five percent price increase for two different (one higher, one lower) firm and market price elasticities.

I assume the telecommunications service to which the price changes and price elasticities applied was a $50 per month "discretionary package." (For purposes of this analysis, this is a purely hypothetical price with no necessary relation to Verizon's actual business revenues.) The analysis is based on a hypothetical 5 percent price increase.[8]

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[5] A market level demand curve shows the relationship between changes in price and quantity demanded from the aggregate of all suppliers in the market, holding everything else constant and assuming all suppliers change their price by the same proportion. In contrast, the firm level demand curve shows the relationship between Verizon's change in price and quantity demand from Verizon, holding everything else constant and assuming no change in prices charged by other firms. The price elasticities of demand for Verizon (or any firm) are larger in magnitude than the price elasticity of demand for the market.

[6] These number were used by the Staff of the NYPSC, *Staff White Paper* Appendix E and were based upon previous analyzes. The NYPSC Staff noted that -1.5 was conservatively low when compared to a -10.1 estimate for competitive long distance service, see *Staff White Paper* at 33.

[7] Specifically, the revenue estimates that I calculate are based upon a constant price elasticity of demand, consistent with the NYPSC Staff approach. A constant price elasticity of demand can be written as: $q = Ap^\varepsilon$ where q is the quantity demanded, p is the price, ε is the own price elasticity of demand and A is an arbitrary positive constant.   Revenue (R) is then $p*q = Ap^{\varepsilon+1}$. Let R_1 and R_2 be revenue before and after the hypothetical price increase, respectively, then $(R_1/R_2) = (p_1/p_2)^{\varepsilon+1}$.

[8] Obviously, the *magnitude* of the revenue effect of the price change is proportional to the initial price of the package, *e.g.*, a lower-priced package would experience a smaller absolute reduction in revenue. Similarly, a smaller price increase would yield a smaller absolute reduction in revenue. However, for the purpose of determining the range of price elasticities and competitive proportions for which a five percent price increase would *reduce* rather than increase revenue, neither the discretionary service package's price *level* nor the absolute size of the price increase is relevant. For any given price elasticity and competitive proportion, the overall revenue effect of a price increase will have the same sign (positive or negative) and will be of the same proportion relative to total revenues prior to the price increase for all values of the price of the good and the size of the price increase. This result is characteristic of a constant elasticity demand curve in which consumers respond to proportionate rather than absolute changes in prices, see *Microeconomic Theory* Walter Nicholson, Dryden Press Third Edition 1985, page 180.

Specifically, the exact price and price change chosen are not relevant for determining whether the price change results in an increase or decrease in revenue: Compared with the revenue effects from a $50 price and a 5 percent price change; the revenue effects based on a business package price that was 10 percent higher (or lower) would be 10 percent higher (or lower), respectively; and, based on a price increase that was twice (or half) as large would be approximately twice (or half) as large, respectively.

C. Results

The revenue impact of a 5 percent price increase on a base price of [**BEGIN CONFIDENTIAL**] [**END CONFIDENTIAL**] per month for various elasticity scenarios is shown below in

Table B.2. The results are presented at the statewide level and at the individual MSA and non-MSA levels.

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Focusing on the base case elasticity scenario (-1.5 and -0.5), the results indicate that if Verizon were to attempt to increase price by 5% it would lose more revenues from its customers that have competitive options than it would gain from its customers that have fewer competitive options. These results apply in the aggregate at the state-level: the level that we believe is the relevant geographic market— and at each of the 16 MSA and non-MSA areas except one.[9] The data in the table also indicate that the results are robust with respect to changes in elasticity assumptions and our conclusions remain under the more conservatively low elasticity scenario (-1.25 and -0.25).

This approach implicitly assumes that there are few avoided costs associated with volume losses, *i.e.*, that revenue changes approximate profit changes—the economically relevant measure for determining whether competition is sufficient to constrain prices. Because Verizon's cost structure is one with high fixed and/or sunk costs and low variable costs, our qualitative conclusions would generally not change if cost savings were explicitly considered. For example, under the default elasticity scenario (-1.5 and -0.5) if variable costs were 20 percent of the initial price (indicative of the fact that prices in general must be much higher than variable costs in order to recover fixed costs), for business services Verizon would suffer profit losses on a statewide basis and would suffer profit losses in every MSA and non-MSAs. For residential services, Verizon would suffer profit losses on a statewide basis and would suffer profit losses all ten MSAs and in five of the six non-MSAs. For the one area that is profitable, the change in profits is marginal compared to total revenues.[10]

The result of this analysis is a high degree of confidence that the extent of intermodal competition alone in Virginia is sufficient to deny Verizon the ability profitably to raise mass market service prices by any substantial amount.

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[9] The non-MSA in question is North where in one of the elasticity scenarios revenues would increase. The revenue increase, however, is small compared to total revenues in the area—based upon the number of customers and a hypothetical $50 price package). Of course, customers in this non-MSAs do have options in the form of either traditional wireline competitors or one intermodal platform, thus diminishing Verizon-VA's ability to increase revenues. And, Verizon-VA's ability to engage in such discreet price discrimination among it geographic areas is extremely limited as economic forces and the requirement to engage in mass market advertising makes the economically relevant area of analysis larger than this non-MSA area. Moreover, as discussed in greater detail in the testimony of Dr. Eisenach, potential competition in North would deter Verizon from raising its prices because many of the existing competitors in the North region market are in a position to expand their presence in the region, and new entry is economically viable.